

## **CLAIMS**

What is claimed is:

1. A method comprising:  
providing a photoresist; and  
altering the liquid-contact properties of the photoresist by adding a set of one or more constituents into the liquid photoresist.
2. The method of claim 1 wherein the set of one or more constituents is determined based upon an index-matching liquid of an immersion lithography exposure system.
3. The method of claim 2 wherein the index-matching liquid is water.
4. The method of claim 3 wherein the set of one or more constituents includes at least one water-insoluble constituent.
5. The method of claim 4 wherein one of the at least one water-insoluble constituents is a constituent selected from the group consisting of a hydrophobic ionic photoacid generator and a non-ionic photoacid generator.
6. The method of claim 4 wherein at least one of the water-insoluble constituents is a water-insoluble quencher.

7. The method of claim 4 wherein at least one of the water-insoluble constituents is a water-insoluble polymer.
8. The method of claim 4 wherein water-soluble constituents are bound to at least one of the water insoluble constituents via a binding method selected from the group consisting of covalent binding, ion pairing, and Van der Waal's forces.
9. The method of claim 4 wherein one or more of the water-insoluble constituents may react when photoresist is used to modulate susceptibility to etch.
10. The method of claim 3 wherein the set of one or more constituents includes at least one water-soluble constituent.
11. The method of claim 10 wherein at least one of the water-soluble constituents is a constituent selected from the group consisting of a water-soluble photoacid generator, a water-soluble quencher, a water-soluble buffer, a water-soluble surfactant, and a water-soluble plasticizer.
12. The method of claim 11 wherein the water-soluble surfactant is a fluorocarbon-based surfactant.

13. An apparatus comprising:  
a substrate; and  
a photoresist deposited on the substrate, the photoresist having incorporated therein one or more additives that alter one or more liquid-contact properties of the photoresist.
14. The apparatus of claim 13 wherein the one or more liquid-contact properties of the photoresist are specific to a particular liquid.
15. The apparatus of claim 14 wherein the particular liquid is water and the one or more additives include at least one hydrophobic additive.
16. The apparatus of claim 15 wherein one of the at least one hydrophobic additives is an ionic photoacid generator.
17. The apparatus of claim 15 wherein one of the at least one hydrophobic additives is a water-insoluble quencher.
18. The apparatus of claim 15 wherein at least one of the water-insoluble constituents is a water-insoluble polymer.
19. The apparatus of claim 15 wherein water-soluble constituents are bound to at least one of the water insoluble constituents via a binding method selected from the group consisting of covalent binding, ion pairing, and Van der Waal's forces.

20. The apparatus of claim 15 wherein one or more of the water-insoluble constituents may react when photoresist is used to modulate susceptibility to etch.
21. The apparatus of claim 15 wherein the particular liquid is water and the one or more additives include at least one hydrophilic additive.
22. The apparatus of claim 15 wherein one of the at least one hydrophilic additives is a water-soluble quencher.
23. The apparatus of claim 15 wherein one of the at least one hydrophilic additives is a water-soluble buffer.
24. The apparatus of claim 15 wherein one of the at least one hydrophilic additives is a water-soluble surfactant.
25. The apparatus of claim 15 wherein the water-soluble surfactant is a fluorocarbon-based surfactant.
26. The apparatus of claim 15 wherein one of the at least one hydrophilic additives is a water-soluble plasticizer.

27. A system comprising:

a lens element of a lithography exposure system, the lens element having a specific index of refraction;

an index-matching liquid in contact with the lens element, the index-matching liquid having an index of refraction equal to the specific index of refraction to within a specified tolerance; and

a photoresist layer in contact with the index-matching liquid, the photoresist layer composed of photoresist having incorporated therein one or more constituents that improve the contact between the index-matching liquid and the photoresist layer.

28. The system of claim 27 wherein the index-matching liquid is water and the one or more constituents includes at least one water-insoluble constituent.

29. The system of claim 28 wherein one of the at least one water-insoluble constituents is a constituent selected from the group consisting of a non-ionic photoacid generator, a hydrophobic ionic photoacid generator, a quencher, a polymer, an oligomer, and a molecular species.

30. The system of claim 29 wherein the index-matching liquid is water and the one or more constituents includes at least one water-soluble constituent wherein at least one of the water-soluble constituents is a constituent selected from the group consisting of a water-soluble photoacid generator, a water-soluble quencher, a water-soluble buffer, a water-soluble surfactant, and a water-soluble plasticizer.